

Serial No. 10/054,911

Art unit: 2874

**Remarks**

The applicants have added a new Figure 6 showing the lower refractive index layer. No new matter has been added since the only difference between Figure 6 and Figure 5 is the addition of the layer 20, which is clearly described in the passage commencing at line 9, page 11.

The applicants have clarified the wording of the claims. Planar waveguide has been replaced by slab waveguide. Claims 7 and 20 have been amended to clarify the structure of the spacer (overcladding) layer, and claim 11 has been amended to make it clear that the refractive index of the additional layer is lower than that of the capping layer (see paragraph commencing at line 9, page 11).

The indication of allowable subject matter in claims 11-13, 24-27, and 33-34 is noted with appreciation.

However, it is respectfully submitted that Deri does not disclose the basic concept underlying the present invention and any structural similarity is purely coincidental. The invention applies to slab waveguides with compensator regions having a different birefringence from the main part of the slab waveguide. Typically the compensator region is formed by etching into the cladding portion of the waveguide.

The applicants have found (see lines 19, 20, page 6) that the birefringence contrast, which is what provides the compensation effect, can be increased by adding a high refractive index layer on top of the compensator. This fact was not known in the prior art and permits a significant advance in this art. The effectiveness of the compensator can be increased by a factor of two or more over a conventional compensator (see lines 23, 24 page 9). The independent claims have been amended to specify the fact that the compensator is a region with different birefringence from the rest of the slab waveguide.

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Deri relates to an entirely different structure wherein two waveguides are coupled together with the core of one waveguide replaced by a multilayer stack selected to cancel the intrinsic birefringence of the waveguide structure. The capping layer referred to by the Examiner is in fact merely the outer cladding layer 30 of the slab waveguide having a multilayer stack forming its core. The waveguide 26 does not have within it a compensator region with different birefringence as defined by the amended claims.

The rejection of claim 5 is respectfully traversed. Claim 13 states that the layered composite, namely the core (see claim 2) may include silicon nitride. There is no teaching that SiN can be used as a capping layer over a compensator. The utility of SiN lies in its high refractive index (1.9), which is important in providing the enhanced birefringence contrast.

As to claim 7, clearly Deri does not teach a higher refractive index capping layer on the residual spacer (or cladding layer).

The objection to claims 6, 8, 19, and 21 as being an obvious design choice are respectfully traversed. In re Leshin applies in a situation for example where one obviously needs a glue and uses a material known to be a glue. None of the materials specified are known to enhance birefringence contrast of compensators, or even like structures. Consequently, there choice is more than one of design choice.

The same reasoning applies to claims 9, 10, 22, 23, 30 and 32. The prior art does not teach enhancing birefringence contrast, and the giving of ranges which optimizes this novel effect is clearly more than routine skill. The Examiner's argument would only hold true if it were known to apply a capping layer for the purposes of enhancing birefringence contrast, and the applicants had merely conducted experiments to find the optimum thicknesses. That is not the case.

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In summary, it is clear that the invention teaches a novel concept, namely that a high refractive index capping material over the a compensator region within a slab waveguide can enhance birefringence contrast. Clearly, this concept is not shown in the prior art and represents an important advance in the art.

Deri merely shows a slab waveguide with a multilayer core to compensate for birefringence effects. He does not show a slab waveguide with a compensator region formed in it and having a contrasting birefringence to the remaining portion of the waveguide. He clearly does not teach the concept outlined above. The so-called capping layer identified by the Examiner is merely the outer cladding layer of the waveguide as a whole, which extends along the full length of the waveguide 26. Waveguides 32, 34 are not part of the same slab waveguide. Claim 1 requires the slab waveguide to have a compensator region formed within it.


It is therefore respectfully submitted that the claims as amended are patentable over the cited prior art.

It is believed that the application is now in condition for allowance. Allowance of the claims on file is now earnestly solicited.

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**In the Drawings**

Permission is respectfully requested to amend the drawings by adding a new Figure 6 as shown in the attached copy.